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# PHILOSOPHICAL TRANSACTIONS.

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Monday, February 10. 166 $\frac{7}{8}$ .

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## The Contents.

*Observations and Tryals about the Resemblances and Differences between a Burning Coal and Shining Wood. An Observation concerning a Blemish in an Horses Eye, not hitherto discover'd by any Author, which may be of great use in the choice of Horses. An Extract of a Letter, written out of Italy, concerning divers Spots, not long since observed there in the Planet Venus. An Extract of another Letter, printed at Paris, touching a late Cure of an inveterate Phrenzy by the Transfusion of Blood. An exact Narrative of an Hermaphrodite now in London. An account of some Books: I. NOUVEAUX ELEMENTS DE GEOMETRIE. II. SYNOPSIS OPTICA, Authore HONORATO FABRI, Soc. Jesu. III. DE VI PERCUSSIONIS, JO. ALPHONS. BORELLI. IV. NICOLAI STENONIS MUSCULI Descriptio GEOMETRICA, &c.*

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## Observations and Tryals

*About the Resemblances and Differences between a Burning Coal and Shining Wood.*

**T**Hese particulars were already in our hands, when we publish'd the Experiments made on shining Wood and Fish, in the last Papers, (imparted then by the same noble Author Mr. Boyle) that those were; but wanted then room enough to contain these, which now follow, as they were sent in a Letter from Oxford, viz.

SSS

And

And now, *sir*, seeing the want of *Shining Wood* hath kept me ever since I sent you the former Experiments from making any new ones on that Subject, I shall, by way of amends, subjoin some of the Observations, that I heretofore intimated to you, I had made of the *Resemblances* and *Differences* between a *Live Coal* and a piece of *Shining Wood*; in pursuing of which, you will easily discern, that to those particulars, which my Memory and the former Observations, I had noted down about light and luminous *Bodies*, had suggested to me, I have added some that have been afforded me by those late Tryals made in my Engine, whereof I sent you an account.

### *Resemblances.*

The things, wherein I observed a piece of *wood* and a burning *Coal* to agree or resemble each other, are principally these Five.

1. *Both of them are Luminaries, that is, give Light, as having it (if I may so speak) residing in them, and not like Looking-Glasses or white Bodies, which are conspicuous only by the incident beams of the Sun, or some other Luminous Body, which they reflect.*

This is evident, because both *Shining Wood* and a *Burning Coal* shine the more vividly, by how much the place wherein they are put is made the darker, by the careful exclusion of the adventitious light. 'Tis true, that the *Moon* and *Venus* appear brightest at or about Midnight, and yet have but a borrowed light; but the difference between those *Planets* and the *Bodies* we treat of, in reference to the difficulty we are considering, is obvious enough. For, though the beholder's Eye, that looks upon those Stars, be advantag'd by being in the dark, which enlarges the *pupil* of the Eye, yet the Object it self is freely exposed to the beams of the *Sun*, which if they were intercepted, those *Planets* would quickly be darken'd, as experience manifests in *Eclipses*.

2. *Both Shining Wood and a Burning Coal need the presence of the Air, and are too of such a density, to make them continue shining.*

This

This has been prov'd as to a *Coal*, by what I long since publish'd in my *Physico-Mechanical Experiments*, where I relate, How quickly a *Coal* would be extinguish'd upon the withdrawing the Air from about it: And as to *Shining Wood*, the Experiments I lately sent you, make it needless for me to add any other proof of the requisiteness not only of Air, but of Air of such a thickness, to make its Light continue. How far this is applicable to *Flame*, it is not necessary here to determin; though, when I have the satisfaction of seeing you again, I may tell you something about that *Question*, which perhaps you do not expect.

3. *Both Shining Wood and a Burning Coal, having been deprived for a time of their light, by the withdrawing of the contiguous Air, may presently recover it by letting in fresh Air upon them.*

The former part of this, particular Tryals have often shewn you to be true, when kindled Coals, that seem to be extinguish'd in our exhausted Receivers, were presently reviv'd when the Air was restored to them: And the latter part is abundantly manifest by the Experiments, to which this Paper is an *Appendance*.

4. *Both a Quick Coal and Shining Wood will be easily quench'd by water and many other Liquors.*

The truth of this, as to *Coals*, is too obvious to need a proof, and therefore I shall confirm it only as to *Wood*. For which purpose you may be pleas'd to take the following Transcript of some of my *Notes* about Light.

I took a piece of *Shining Wood*, and having wetted it with a little common Water in a clear Glass, it presently lost all its light\*.

The like Experiment I tried with strong *Spirit of Salt*, and also with weak *Spirit of Sal Armoniack*; but in both, the light did upon the *Wood's* imbibing of the Liquor presently disappear.

And lest you should think, that in the words, *Many other Liquors*, I intended not to comprise any, that consist of soft and unctuous parts, or that are highly inflammable, I shall sub-

\* From hence you will easily gather the reason why, when I lately told you of the Trial I made with a piece of *Shining Fish* under Water in the unexhausted Receiver, I did not propose to have the like Trial made with *Shining Wood* and Water; but for this Liquor substituted *Mercury*.

joyn a couple of *Notes*, that I find next to those just now transcribed.

I made the like Tryal with rectified *Oyl* of *Turpentine*, with a not unlike success. The same Experiment I tried more than once with high rectified *Spirit* of *Wine*, which did immediately destroy all the light of the Wood that was immerfed in it; and having put a little of that Liquor with my finger upon a part of the whole piece of Wood that shone very vigorously, it quickly did, as it were, quench the Coal as far as the Liquor reach'd; nor did it in a pretty while regain its luminousness: ( Which whether it recover'd at all, I know not; for this Trial being made upon my Bed, I fell asleep, before I had waited long enough to finish the Observation.)

5. *As a Quick Coal is not to be extinguish'd by the coldness of the Air, when that is greater than ordinary; so neither is a piece of Shining Wood to be deprived of its light by the same quality of Air.*

As much of this Observation as concerns the *Coal*, will be readily granted, and for proof of the other part of it, I could relate to you more Trials than one, but that I suppose, one may suffice, circumstanc'd like that, which I shall now relate.

I took a small piece of *Shining Wood*, and put it into a slender Glass-pipe, sealed at one end, and open at the other, and placed this Pipe in a Glass Vessel, where I caus'd to be put a strongly frigorifick mixture of *Ice* and *Salt*, and having kept it there full as long as I thought would be requisite to freeze an Aqueous Body, I afterwards took it out, and perceived not any sensible Diminution of its light. But to be sure, the frigorifick mixture should not deceive me, I had placed by this Pipe another, almost filled with Water, which I found to be turn'd into *Ice*; and though I suffer'd the Wood to remain, a pretty while after, expos'd to so intense a Cold, yet when I took it out, it continued shining, and, if I much mistake not, it ceas'd not to do so, when I look'd on it, 24 hours after. But though the light of *Shining Fish* be usually (as far as I have observed) more vigorous and durable, than that of *Shining Wood*; yet I cannot say, that it will hold out against Cold so well as the other: For having ordered one of my Servants to cut off a good large  
piece

piece of the luminous *whiting*, and bury it in *Ice* and *Salt*, when I call'd for it in less than half an hour after, I found it much stiffen'd by the Cold, and to have no light, that I could discern in a place dark enough. And for fear, that this effect may have proceeded not barely from the operation of the *Cold*, but also from that of the *salt* ( for which suspicion you would see reason enough, if I could shew you my Trials about *Shining Fish* ) I caus'd another time a piece of *whiting* to be put in a Pipe of Glass seal'd at one end, and having seen it shine there, I look'd upon it again, after it had stay'd but a quarter of an hour, by my estimate, in a frigorifick mixture, which the Glass kept from touching the Fish; and yet neither I, nor a Youth that I employ'd to look on it, could perceive in a dark place, that it retained any light; which *whether* the Cold had deprived it of by that great change of Texture, that the Congelation of the Aqueous Juice of the Fish (which I have several times observed to be luminous) may be suppos'd to have made in the Body invaded by it; or whether the effect depend more principally on some other cause, I shall not now examine.

### *Differences.*

I. *The first difference I observed betwixt a Live Coal and Shining Wood, is, That whereas the light of the former is readily extinguishable by Compression ( as is obvious in the practice of suddenly extinguishing a piece of Coal by treading upon it ) I could not find that such a Compression; as I could conveniently give, without losing sight of its operation, would put out, or much injure the light, even of small fragments of Shining Wood. One of my Trials about which I find thus set down among my Notes about Light.*

I took a piece of *shining wood*, and having press'd it between two pieces of clear Glass ( whereof the one was pretty flat, and the other convex ) so that I could clearly see the Wood through the Glass, I could not perceive, that the compression, though it sometimes broke the Wood into  
several

several fragments, did either destroy or considerably alter the Light.

This Experiment I repeated with the same success. But what a stronger or more lasting Compression may do in this case, I had not opportunity to try.

2. *The next unlikeness to be taken notice of betwixt Rotten Wood and a Kindled Coal, is, That the latter will in very few minutes be totally extinguish'd by the withdrawing of the Air; whereas a piece of Shining Wood, being eclipsed by the absence of the Air, and kept si for a time, will immediately recover its Light, if the Air be let in upon it again within half an hour after it was first withdrawn.*

The former part of this Observation is easily proved by the Experiments that have been often made upon *Quick Coals* in the *Pneumatical Engine*; and the truth of the latter part appears by an Experiment about *Shining wood* made by us in *October* last. Neither is it unprobable, that if I had had conveniency to try it, I should have found, that a piece of *Shining wood*, deprived of its light by the removal of the ambient Air, would retain a disposition to recover it upon the return of the Air, not only for half an hour, ( which is all that I lately asserted ) but for half a day, and perhaps a longer time.

3. *The next difference to be mentioned, is, That a Live Coal being put into a small close Glass, will not continue to burn for very many minutes; but a piece of Shining Wood will continue to shine for some whole days.*

The first part of the Assertion I know you will readily grant, and the rather, because it contains matter of fact, without at all determining, whether the Coals not continuing to burn, proceeds from its being, as it were, stifled by its own smoak and exhalations, ( which can have no vent in a small close Glass ) or from the want of fresh Air, or from any particular cause, which I must not here debate; though I have sometimes made Experiments somewhat odd to facilitate that enquiry. The other part of our Observation may be easily made out by what I tried upon *Shining wood*, sealed up Hermetically in very small Glasses, where the Wood did for several days ( though I remember not precisely how many ) retain its Light.

4. *A fourth Difference may be this: That whereas a Coal, as it burns, sends forth store of smoak or exhalations; Luminous Wood does not so.*

5. *A fifth, flowing from the former, is, That whereas a Coal in shining wasts it self at a great rate, Shining Wood does not.*

These two unlikenesses I mention together, not only because of their affinity, but because what concerns the *Coal* in both, will need no proof; and as for what concerns *Rotten Wood*, it may be verified by an Observation, that I find by my *Notes* I made in a piece of it Hermetically sealed up in a small clear Glass; where after it had continued luminous some days, I lookt on it in the day-time to perceive, if any store of spirits or other steams had, during all that while, exhaled from the Wood, but could not find any on the inside of the Glass, save that in one place there appeared a kind of Dew, but consisting of such very small drops (if at least their Size were not below that name) that a multitude of them would go to the making up of one ordinary drop. But in pieces of *Shining Fish* I found the case much otherwise, as was to be expected.

6. *The last Difference I shall take notice of betwixt the Bodies hitherto compared, is, That a Quick Coal is actually and vehemently hot; whereas I have not observed Shining Wood to be so much as sensibly lukewarm.*

What is said of the *Coals* heat, being as manifest as its light, I shall need only to make out what relates to the *Shining Wood*. To assist me wherein, I meet among my *Notes* that, whose Transcript I shall subjoyn, when I have premis'd, that (if my memory do not deceive me) the piece of Wood to be mentioned was one, that shone so vividly, that waking in the Night some hours before I tryed it, and perceiving, as it lay near me on the Bed, how luminous it was, I was invited to reach out to a place near the Beds-head, where there stood several Books, and laying the Wood on that which came to hand, I could discern by the light of it, that the Book was an *Hebrew Bible*, and that of the Page I lighted on, the wrong end was turned upwards: To which intima-  
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tion having added, that the little Glas-Instrument, mentioned in the *Note*, is such an one, as you may find described in my *Preliminaries* to the *History of Cold*, save that part of this was a little bending inward at the *Basis*, that it may sometimes stand by *it self*, and sometimes receive a small body into the *dimple* at its *Basis*: Having, I say, premised this, and, that as *Shining Wood* did not feel at all warm to me, so I also found *Shining Fish* palpably cold, I shall conclude your trouble with the premised *Note*, which speaks thus:

[ I put upon a large piece of Wood, which was partly shining, and, as near as I could, upon one of the most luminous parts of it, one of those *Thermoscopes*, that I make with a pendulous drop of Water. But as I had formerly try'd, that by laying the tip of my Nose or Finger upon it, when it shone vividly enough, to enable me to discern both the one and the other, at the time of contact I could not perceive the least of heat, but rather an actual coldness, so by this Trial I could not satisfy myself, that it did visibly raise the pendulous drop, though the Instrument were so tender, that by approaching one Finger near it, yet without actually touching of it, it would manifestly be impelled up, and upon the removal of my Finger, would presently descend again.]

And I remember, that having put such an Instrument upon a *Shining Fish*, that was pretty large, I could not thereby perceive, that it had any degree of heat, but rather the contrary. For having divers times taken off the Glas, to apply it with the more advantage to several parts of the *Luminous Fish*, I divers times (for I remember not whether 'twere always) took notice, that upon the removal of the Glas into the Air, the pendulous drop would manifestly rise a little, and subside again when the Glas was applied to the Fish. But whether this part of the Experiment will hold in all temperatures of the Air, I had not opportunity to try.